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NASA-05096 (June 2004)
NATIONAL AERONAUTICS **NASA**
AND SPACE ADMINISTRATION **Superseding NASA-05096**
(December 2003)

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SECTION 05096

WELDING ALUMINUM CONSTRUCTION

06/04

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SECTION 05096

WELDING ALUMINUM CONSTRUCTION
06/04

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NOTE: Delete, revise, or add to the text in this section to cover project requirements. Notes are for designer/specifier information and will not appear in the final project specification.

This specification covers the minimum requirements for qualifying welding procedures, welders, and welding operators for making and inspecting welds in structural and non-structural fabrications of weldable aluminum materials.

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PART 1 GENERAL

1.1 REFERENCES

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NOTE: The following references should not be manually edited except to add new references. References not used in the text will automatically be deleted from this section of the project specification.

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The publications listed below form a part of this section to the extent referenced:

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1/D1.1M	(2004) Structural Welding Code - Steel
AWS D1.2	(2003) Structural Welding Code Aluminum

ASTM INTERNATIONAL (ASTM)

ASTM E 165	(2002) Standard Test Method for Liquid Penetrant Examination

1.2 DEFINITIONS

The following classifications shall establish levels of fabrication.

1.2.1 Class A Fabrication

Class A fabrication shall include complete penetration weld joints only,

and shall apply to those welds where failure would cause a loss of the system and/or be hazard to personnel. Welds which are highly stressed (dynamic and cyclic loading) and characterized as a single point of failure with no redundancy for the redistribution of stress into another member, shall be classified as a Class A fabrication.

1.2.2 Class B Fabrication

Class B fabrication shall include complete and partial penetration groove weld joints and fillet weld joints, and shall apply to those welds where failure would reduce the overall efficiency of the system but loss of system or hazard to personnel would not be experienced.

1.2.3 Class C Fabrication

Class C fabrication shall include complete and partial penetration groove weld joints and fillet weld joints, and shall apply to those welds where failure would not affect the efficiency of the system nor create hazard to personnel. Welds for connections of secondary members not subject to dynamic action and low stressed miscellaneous applications, shall be classified as a Class C fabrication.

1.2.4 Class D Fabrication

Plug and slot weld joints may be used for subcritical construction joints, when the joints meet all the applicable Sections 2, and [8], [9], [10], [11], design and fabrication requirements of AWS D1.2.

1.3 HEAT INPUT REQUIREMENTS

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NOTE: Welding a material which is at an initial temperature below 100 degrees F 38 degrees C may require localized preheating to remove moisture from the surface of the material.

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1.3.1 Preheat

Welding shall not be done at ambient temperature below 32 degrees F 0 degrees C, or when the surfaces are wet or exposed to rain, snow, or high wind. Temperature of the metals in the area where the welding is to be done shall be not less than 50 degrees F 10 degrees C. When the ambient conditions are such that the normal temperature of the base metal is below 50 degrees F 10 degrees C, the area surrounding the joint shall be preheated to provide a base metal temperature of 100 degrees F 38 degrees C for a distance of at least 3 inches 75 millimeter in all directions from the joint to be welded.

1.3.2 Interpass

In a multipass weld, the interpass temperature is the temperature of the weld metal before the next pass is started.

1.3.3 Postweld

Weldments shall not be given a postweld heat treatment unless noted in the applicable [NASA approved] Code qualified/certified welding documentation, WPS, PQR, and WPQ.

1.4 SUBMITTALS

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NOTE: Review submittal description (SD) definitions in Section 01330 SUBMITTAL PROCEDURES and edit the following list to reflect only the submittals required for the project. Submittals should be kept to the minimum required for adequate quality control. Include a columnar list of appropriate products and tests beneath each submittal description.

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The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES in sufficient detail to show full compliance with the specification:

SD-07 Certificates

The following items shall be submitted in accordance with paragraph entitled, "Welding Documentation," of this section.

Certified Welding Procedure Specifications (WPS)
Certified Procedure Qualification Records (PQR)
Certified Welder Performance Qualifications (WPQ)

1.5 QUALIFICATIONS

1.5.1 Certificates

Welding Contractor shall be certified in accordance with American Institute of Steel Construction (AISC) Quality Certification Program for the applicable category:

[Category I - Conventional Steel Structures]
[Category II - Complex Steel Building Structures]
[Category - III Major Steel Bridges]

1.5.2 Welding Documentation

The Contractor shall submit for approval to the Contracting Officer [two] [_____] copies of Certified Welding Procedure Specifications (WPS) and Certified Procedure Qualification Records (PQR) within [fifteen] [_____] calendar days after receipt of Notice to Proceed.

The Contractor shall submit for approval to the Contracting Officer [two] [_____] copies of Certified Welder Performance Qualifications (WPQ), within [fifteen] [_____] calendar days prior to any employee welding on project material.

No pre-qualified welding procedures shall be allowed. Contractor shall qualify the welding procedures, welders and welder operators in accordance with Section 5 of AWS D1.2.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 CONSTRUCTION

3.1.1 Class A Fabrication

Complete penetration groove weld joints shall be used where possible. Weldment shall be fabricated in accordance with Section [9] [10] of AWS D1.2.

3.1.2 Class B Fabrication

Weldment shall be fabricated in accordance with the requirements of applicable section, Section [8] [10] of AWS D1.2.

3.1.3 Class C Fabrication

Weldment shall be fabricated in accordance with the requirements of Section 11 of AWS D1.2.

3.1.4 Class D Fabrication

Welding of plugs and slot joints shall meet the minimum applicable requirements of Section 2 and [8], [9], [10], [11], of AWS D1.2.

3.2 INSPECTION/NONDESTRUCTIVE EXAMINATION (NDE)

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NOTE: Inspection and acceptance requirements of these Codes and Standards are the minimum requirements. Additional inspections and tighter acceptance requirements may be used, but the specifier must note the additional NDE requirements in the specifications/drawings.

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3.2.1 Inspection

Fabrication/Erection inspection shall be performed as necessary prior to assembly, during assembly, during welding, and after welding to ensure that materials and workmanship meet the minimum requirements of the contract documents.

Final acceptance of all welded joints shall be by the Contracting Officer.

Unacceptable welds shall be immediately repaired and made ready for Government reinspection at no additional cost to the Government.

After weld joints have been satisfactorily completed by the Contractor and accepted by the Contracting Officer, the joint area shall be cleaned to a bright, unpitted, and unscarred surface and then protected in accordance with the applicable contract documents.

3.2.2 Methods of NDE

Examination/inspection of structural aluminum weldments shall be performed in accordance with AWS D1.2.

3.2.2.1 Visual Inspection (VT)

Visual inspection for cracks and other discontinuities shall be aided by a magnifying lens of [5X] [10X] power wherever required to discern indications or defects otherwise not clear. Size and contour of welds shall be measured with suitable gages.

3.2.2.2 Liquid Penetrant Inspection (PT)

Liquid penetrant inspection of welds shall be performed in accordance with ASTM E 165.

3.2.2.3 Radiographic Inspection (RT)

Radiographic inspection of welds shall be performed in accordance with the requirements of Section 6.10, AWS D1.1/D1.1M.

3.2.2.4 Ultrasonic Inspection (UT)

When ultrasonic testing is required by the contract documents, the extent of testing, the procedure, and the acceptance criteria shall be specified therein.

3.2.3 Levels of Examination

3.2.3.1 Level I Examination

Level I examination shall require 100 percent visual inspection (VT), and 100 percent radiographic inspection (RT) where practical. Where RT is not practical, liquid penetrant inspection (PT) of the root pass and the final surface of each weld joint shall be performed.

Where applicable, each radiograph shall, as a minimum, have the following additional information permanently included in the image:

Agency Weld No. (including repair cycle no.)

Agency Drawing No.

Agency View No.

Agency Contract No.

Final interpretation and acceptance of all radiographs of welded joints will be by the Contracting Officer.

3.2.3.2 Level II Examination

Level II examination shall require 100 percent visual inspection (VT), and liquid penetrant inspection (PT) of the final surface of each weld joint.

3.2.3.3 Level III Examination

Level III examination shall require 100 percent visual inspection (VT) of each weld joint.

3.2.4 Acceptance Requirements

3.2.4.1 Class A Fabrication

Class A fabrication shall receive a Level I examination. Weldments shall be in accordance with Section 3 and Section [9] [10], AWS D1.2.

3.2.4.2 Class B Fabrication

Class B fabrication shall receive a Level II examination. Weldments shall be in accordance with Section 3 and Section [8] [10], AWS D1.2.

3.2.4.3 Class C & D Fabrication

Class C & D fabrication shall receive a Level III examination. Weldments shall be in accordance with Section 3 and Section 11, AWS D1.2.

3.3 PROTECTION OF ADJACENT MATERIALS

Contractor shall sufficiently protect equipment adjacent to the welding/brazing operations to prevent any damage from these operations.

-- End of Section --